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device and the third semiconductor island is located in a light sensor region of the semiconductor device.

Y20 cmd

59. (New) A device according to claim 36, wherein the first and second semiconductor islands are located in a semiconductor switch region of the semiconductor device and the third semiconductor island is located in a light sensor region of the semiconductor device.--

REMARKS

Applicant would like to thank the examiner for the consideration given the above-identified application. The Office Action of **June 21, 2001**, has been received and its contents carefully noted. Filed concurrently herewith is a *Request for a One (1) Month Extension of Time* that extends the shortened statutory period for response to **October 21, 2001 (Sunday)**. Accordingly, Applicant respectfully submits that this response is timely filed.

Claims 1-40 were pending in the present application prior to the aforementioned amendment. By the above Amendment, claims 1, 3, 5-10, 15, 17, 19-23, 29-31, 33, 35, 36, and 40 are amended and new claims 41-59 are added to recite subject matter to which Applicant is already entitled. New claims 41-47 are supported at least on page 6 lines 32-35 of the specification, while new claims 48-57 are supported at least on page 6 lines 32-35 of the specification. Accordingly, Applicant submits that no issue of new matter has been set forth by this Amendment. Accordingly, claims 1-59 are now pending in the subject application and are believed to be in condition for allowance at least for the reasons advanced hereinbelow.

Initially, the Office Action objects to the specification for containing various

informalities. Applicant has reviewed the specification for grammatical errors, and, by the above Amendment, have corrected those errors noted by the Examiner. Reconsideration and withdrawal of the objection is respectfully solicited.

The Office Action rejects claims 1-4 under 35 U.S.C. §112, first paragraph as nonenabling for an amorphous or polycrystalline semiconductor. By the above Amendment, Applicant amends the claims in order to be reasonably enabled by the specification. In particular, independent claim 1 is amended to recite --wherein a semiconductor region of the light sensor region and an active region of the semiconductor switch comprise the same semiconductor layer, the semiconductor layer having a semi-amorphous structure formed over the substrate, and wherein a Raman spectrum of the semiconductor layer exhibits a peak deviated from that which stands for a single crystal for the semiconductor.-- Reconsideration and withdrawal of the rejection is respectfully requested.

The Office Action rejects claims 6-8 and 21 under 35 U.S.C. §102(b) as anticipated by ***Morozumi***, claims 1-5, 8-11, 13-19, 21-25 and 27-40 under 35 U.S.C. §103(a) as unpatentable over ***Morozumi*** in view of ***Yamazaki et al. '987***, and claims 6, 7, 12, 20 and 26 under 35 U.S.C. 103(a) as unpatentable over ***Masaki '663*** in view of ***Yamazaki et al. '987***. Please note that Applicant would like the Examiner to confirm whether the ***Morozumi*** patent has been previously cited during prosecution of the above-identified application. The PTO-892 of June 21, 2001 (or previously submitted PTO-892s) and previously submitted Form PTO-1449s do not cite this reference. In this regard, Applicant requests a full copy of the ***Morozumi*** patent in the next communication from the Patent Office. By the above Amendment, claims 1, 3, 5-10, 15, 17, 19-23, 29-31, 33, 35, 36, and 40 are amended and new claims 41-59 are added to recite subject matter to which Applicant is already entitled. This fact notwithstanding, Applicant contends that

the claimed invention was already patentably distinct over the cited related art references.

The claimed invention is directed generally to a device for sensing light comprising a semiconductor region of a photoelectric conversion semiconductor device and an active layer of a thin film transistor comprising the same semiconductor layer over a substrate.

Applicants submit that the claimed invention as presently amended recites features which are patentably distinct over the prior art. More particularly, Applicant respectfully contends that the ***Morozumi*** and ***Masaki '663*** patents, either alone or in combination with the ***Yamazaki et al. '987*** patent, fails to expressly teach or inherently suggest all of the limitations presently set forth in the claimed invention necessary to anticipate the claimed invention under §102 or render the claimed invention obvious under §103.

For example, the Office Action finds that the ***Morozumi*** patent teaches a solid state image sensor having switch region and light sensor region and the layers 22-24 and 30 can be made of the same amorphous or polycrystalline silicon. The ***Yamazaki et al. '987*** patent is cited to show a semi-amorphous silicon film. It should noted, however, that the layers 22-24 (for an island of the thin film transistor) and the layer 30 (for photosensitive member) of the ***Morozumi*** patent are not made of the same semiconductor layer since the layer 30 is located over the layers 22-24 with an insulating film 25 and an electrode 28 with interposed therebetween. Accordingly, the ***Morozumi*** patent, either alone or in combination with the ***Yamazaki et al. '987*** patent, fails to expressly teach or implicitly suggest a semiconductor region of a photoelectric conversion semiconductor device and an active layer of a thin film transistor comprising the same semiconductor layer over a substrate, as set forth in the claimed invention.

Regarding claim 2, although the Examiner asserts that the phrase "and the like" in the ***Morozumi*** patent includes "the well known hydrogen doped amorphous silicon," Applicant respectfully contend that such a finding is improper. Regarding the rejection

of claims 31-40, the insulation layer 25 of the ***Morozumi*** patent is not a blocking layer since the insulating layer 25 is interposed between the semiconductor island 22-24 and the photosensitive member 30.

Accordingly, since the cited related art references fail to teach, disclose or reasonably suggest each and every feature of the claimed invention, Applicant respectfully submits that the combined references are inadequate and fail to anticipate or render the claimed invention obvious. Accordingly, Applicants respectfully request that the §102 and §103 rejections of the pending claims be reconsidered and withdrawn in view thereof.

For the reasons expressed above, it is respectively submitted that pending claims are in proper condition for allowance. Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,

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MARKED UP VERSION OF SUBSTITUTE PARAGRAPH.

On page 1, please replace the fifth full paragraph with the following substitute paragraph. Attached hereto is a marked-up copy of the amended substitute paragraph.

--As an example [of] that the diode type serving as the photoelectric conversion device has been well [know] known is a semiconductor structure in which PN or PIN junction is formed on a silicon substrate or an insulating substrate with monocrystal silicon semiconductor, polycrystal silicon semiconductor or amorphous silicon semiconductor. A conventional photoelectric conversion device is designed as a best device so that semiconductor layers having a PN or PIN junction are laminated on a moncrystal silicon substrate or an insulating substrate and positive and negative electrodes are formed on the top and bottom surfaces of the semiconductor layers. Further, the junction surface of the PN or PIN junction has been conventionally designed substantially in parallel with the principal plane of the semiconductor layers or the substrate to irradiate a large amount of light onto the junction surface.--

On page 3, please replace the fourth full paragraph with the following substitute paragraph. Attached hereto is a marked-up copy of the amended substitute paragraph.

--Still further, the semiconductor film thus obtained has an electrical characteristic of 10 to 200cm^{-2}/Vsec in hole mobility, and 15 to 300^{-2}/Vsec in electron mobility. Therefore, the TFT has a remarkably high photoresponsivity [photoresponsibility].--

On page 9, please replace the seventh full paragraph with the following substitute paragraph. Attached hereto is a marked-up copy of the amended substitute paragraph.

--Through a series of processes as described above, the P-type TFT portion 100, the N-type TFT portion 200 and the photoelectric conversion device portion 300 are

formed on the same glass substrate 1 using the same silicon semiconductor film. FIG 1(F) shows the image reading unit which is finally completed through the above processes. The following are [is] characteristics (carrier mobility and threshold voltage Vth) of the P-type TFT and the N-type TFT, respectively.--

MARKED UP VERSION OF AMENDED CLAIMS

1. (Three Times Amended) A device for sensing a light comprising:

[a semiconductor layer formed on a substrate, said semiconductor layer comprising] a light sensor region and a semiconductor switch region adjacent to and operatively connected with said light sensor region over a substrate,

wherein a semiconductor region of the light sensor region and an active region of the semiconductor switch comprise the same semiconductor layer, the semiconductor layer having a semi-amorphous structure formed over the substrate, and

wherein a Raman spectrum of the semiconductor [film] layer exhibits a peak deviated from that which stands for a single crystal for the semiconductor.

3. (Amended) [The device of claim 1 wherein said semiconductor switch region comprises a thin film transistor of which active region is formed of said semiconductor layer] An electric equipment having a device according to claim 1, wherein the electric equipment is selected from the group consisting of a facsimile machine, an image reader, and a digital copying machine.

5. (Three Times Amended) A device for sensing a light produced by a process comprising the steps of:

depositing a semiconductor [material on] layer over a substrate;

forming a photoelectric conversion semiconductor device on said substrate, a semiconductor region of the photoelectric conversion semiconductor device comprising a p-type impurity semiconductor region, an intrinsic semiconductor region, and an n-type impurity semiconductor region[, a semiconductor region of said photoelectric conversion semiconductor device being made of said semiconductor material]; and

forming a thin film transistor [on said substrate which constitutes an electric circuit required to drive said photoelectric conversation semiconductor device, a semiconductor region of said thin film transistor being made of said semiconductor material] for driving the photoelectric conversion semiconductor device over the substrate, an active layer of the thin film transistor comprising a source region, a drain region, and a channel region[;],

wherein said semiconductor regions are arranged in order with said p-type impurity semiconductor region adjacent said intrinsic semiconductor region and said intrinsic semiconductor region adjacent said n-type impurity semiconductor region in said photoelectric conversion semiconductor device, said order being in a direction perpendicular to that in which a light to be sensed is incident thereon, and

wherein the semiconductor region of the photoelectric conversion semiconductor device and the active layer of the thin film transistor comprise the same semiconductor layer.

6. (Amended) The device of claim [4] 1 wherein [said two semiconductor regions of the light sensor region are laterally arranged on said substrate] the semiconductor layer has lattice distortion and the peak of a laser Raman spectrum of the semiconductor layer is shifted to a lower wave number than $520cm^{-1}$.

7. (Amended) The device of claim 5 wherein [said photoelectric conversion semiconductor device further comprises and amorphous semiconductor film provided on a side of said intrinsic semiconductor region on which said light in incident through said amorphous semiconductor film] the semiconductor layer has lattice distortion and the peak of a laser Raman spectrum of the semiconductor layer is shifted to a lower wave

number than 520cm^{-1}.

8. (Twice Amended) A device for sensing a light comprising:

[a semiconductor layer formed on a substrate, said semiconductor layer comprising] a light sensor region and a semiconductor switch region adjacent to and operatively connected with said light sensor region over a substrate,

wherein a semiconductor region of the light sensor region and an active region of the semiconductor switch region comprise the same semiconductor layer formed over the substrate, and

wherein said semiconductor layer has at least one of an electron mobility 15-300 cm^2/Vsec and a hole mobility 10-200 cm^2/V sec.

9. (Amended) A device for sensing a light comprising:

[a semiconductor layer formed on a substrate, said semiconductor layer comprising] a light sensor region and a semiconductor switch region adjacent to and operatively connected with said light sensor region over a substrate,

wherein a semiconductor region of the light sensor region and an active region of the semiconductor switch region comprise the same semiconductor layer formed over the substrate, and

wherein said semiconductor layer has a structure in which a Raman spectrum of the semiconductor [film] layer exhibits a peak deviated from that which stands for a single crystal for the semiconductor, and said semiconductor switch region comprises complementary p-channel and n-channel thin film transistors.

10. (Amended) The device of claim 9 wherein said semiconductor [film] layer

comprises hydrogen doped silicon.

15. (Amended) A device for reading an image comprising:

[a semiconductor layer formed on a substrate, said semiconductor layer comprising] an image sensor region and a semiconductor switch region adjacent to and operatively connected with said image sensor region over a substrate,

wherein a semiconductor region of the image sensor region and an active region of the semiconductor switch region comprise the same semiconductor layer formed over the substrate, and

wherein said semiconductor layer has a semi-amorphous structure comprising a mixture of amorphous and crystalline structures, in which a Raman spectrum of the semiconductor film exhibits a peak deviated from that which stands for a single crystal of the semiconductor.

17. (Amended) The device of claim 15 wherein said semiconductor switch region comprises a thin film transistor of which the active region is formed of said semiconductor layer.

19. (Amended) A device for reading an image produced by a process comprising the steps of:

depositing a semiconductor [material on] layer over a substrate;

forming a photoelectric conversion semiconductor device on said substrate, a semiconductor region of said photoelectric conversion semiconductor device comprising a p-type impurity semiconductor region, an intrinsic semiconductor region, and an n-type impurity semiconductor region[, a semiconductor region of said photoelectric conversion semiconductor device being made of said semiconductor material]; and

forming a thin film transistor on said substrate [which constitutes an electric circuit required to read an image, a semiconductor region of said thin film transistor being made of said semiconductor material], an active region of the thin film transistor comprising a source region, a drain region, and a channel region,

wherein the semiconductor region of said photoelectric conversion semiconductor device and the active region of the thin film transistor comprise the same semiconductor layer, and

wherein said semiconductor regions are arranged in order with said p-type impurity semiconductor region adjacent said intrinsic semiconductor region and said intrinsic semiconductor region adjacent said n-type impurity semiconductor region in said photoelectric conversion semiconductor device, said order being in a direction perpendicular to that in which an image to be read is incident thereon.

20. (Amended) The device of claim [19] 15 wherein [said two semiconductor regions of the image light sensor region are laterally arranged on said substrate] the semiconductor layer has lattice distortion and the peak of a laser Raman spectrum of the semiconductor layer is shifted to a lower wave number than $520cm^{-1}$.

21. (Amended) The device of claim 19 wherein [said photoelectric conversion semiconductor device further comprises an amorphous semiconductor film provided on a side of said intrinsic semiconductor region on which said image is incident through said amorphous semiconductor film] the semiconductor layer has lattice distortion and the peak of a laser Raman spectrum of the semiconductor layer is shifted to a lower wave number than $520cm^{-1}$.

22. (Twice Amended) A device for reading an image comprising:

[a semiconductor layer formed on a substrate, said semiconductor layer comprising] an image sensor region and a semiconductor switch region adjacent to and operatively connected with said image sensor region over a substrate,

wherein a semiconductor region of the image sensor region and an active region of the semiconductor switch region comprise the same semiconductor layer formed over the substrate, and

wherein said semiconductor layer has at least one of an electron mobility 15-300 $cm^2/Vsec$ and a hole mobility 10-200 cm^2/V sec.

23. (Amended) A device for reading an image comprising:

[a semiconductor layer formed on a substrate, said semiconductor layer comprising] an image sensor region and a semiconductor switch region adjacent to and operatively connected with said image sensor region over a substrate,

wherein a semiconductor region of the image sensor region and an active region of the semiconductor switch region comprise the same semiconductor layer formed over the substrate, and

wherein said semiconductor layer has a semi-amorphous structure in which a Raman spectrum of the semiconductor film exhibits a peak deviated from that which stand for a single crystal of the semiconductor, and said semiconductor switch region comprises complementary p-channel and n-channel thin film transistors.

29. (Amended) A device for sensing a light comprising:

[a semiconductor layer formed on a substrate, said semiconductor layer comprising] a light sensor region and a semiconductor switch region adjacent to and operatively

connected with said light sensor region over a substrate,

wherein a semiconductor region of the light sensor region and an active region of the semiconductor switch region comprise the same semiconductor layer formed over the substrate, and

wherein said semiconductor layer has at least one of an electron mobility greater than 15 cm^2/Vsec and a hole mobility greater than 10 cm^2/Vsec.

30. (Amended) A device according to claim [29] 19 wherein said semiconductor layer has at least one of an electron mobility greater than 15 cm^2/Vsec and a hole mobility greater than 10 cm^2/Vsec.

31. (Amended) A semiconductor device comprising:

a substrate;

a blocking layer on said substrate;

first, [and] second, and third semiconductor islands on said blocking layer;

[a pair of] p-type impurity regions in said first semiconductor island with a first channel region interposed therebetween and in a first region of said third semiconductor island;

[a pair of] n-type impurity regions in said second semiconductor island with a second channel region and in a second region of said third semiconductor island;

[a gate] an insulating film on said first, [and] second, and third semiconductor islands; and

first and second gate electrodes over said first and second channel regions, respectively, with said [gate] insulating film interposed therebetween,

wherein a Raman spectrum of each of said first, [and] second, and third

semiconductor islands exhibits a peak deviated from that which stands for a single crystal of the semiconductor.

33. (Amended) A device according to claim 31, wherein said [gate] insulating film is a silicon oxide film containing fluorine.

35. (Amended) A device according to claim 31, wherein said [N]n-type impurity regions contain phosphorus.

36. (Amended) A device comprising:

a substrate;

a blocking layer on said substrate;

first, [and] second, and third semiconductor islands on said blocking layer;

[a pair of] p-type impurity regions in said first semiconductor island with a first channel region interposed therebetween and in a first region of said third semiconductor island;

[a pair of] n-type impurity regions in said second semiconductor island with a second channel region and in a second region of said third semiconductor island;

[a gate] an insulating film on said first, [and] second, and third semiconductor islands; and

first and second gate electrodes over said first and second channel regions, respectively, with said [gate] insulating film interposed therebetween,

wherein said first semiconductor island has a mobility of 10-300 cm^2/Vsec and said second semiconductor island has a mobility of 15-300 cm^2/Vsec.

40. (Amended) A device according to claim 32, wherein said [N]n-type impurity regions contain phosphorus.